DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

E10EA-7
AVCO Lycoming
TIO-541-A1A
TIO-541-E1A4, -E1B4
-E1C4, -E1D4

April 4, 1986

TYPE CERTIFICATE DATA SHEET NO. E10EA

Engines of models described herein conforming with this data sheet (which is a part of Type Certificate No. E10EA) and other approved data on file with the Federal Aviation Administration, meet the minimum standards for use in certificated aircraft in accordance with pertinent aircraft data sheets and applicable portions of the Civil Air Regulations/Federal Aviation Regulations provided they are installed, operated and maintained as prescribed by the approved manufacturer's manuals and other approved instructions.

Type Certificate Holder — AVCO Lycoming Williamsport Division
AVCO Corporation
Williamsport, Pennsylvania 17701

Model Lycoming TI0-541	-A1A	-E1A4, -E1B4 , -E1C4, -E1D4
Type 6H0A Direct Drive Turbosupercharged		
Rating (See NOTE 4)		
Maximum continuous, hp., r.p.m, in. Hg., at:	310-2575-37.0-15,000	380-2900-41.9-15,000
Standard density, critical alt. ft.	310-2575-37.0-S.L.	380-2900-41.0-S.L.
Standard density, sea level alt. ft.		
Takeoff (5 min.), hp., r.p.m., in. Hg., at:		
Standard density, critical alt. ft.	310-2575-37.0-15,000	380-2900-41.9-15000
Standard density sea level alt. ft.	310-2575-37.0-S.L.	380-2900-41.0-S.L.
Fuel (minimum grade aviation gasoline)	100/130	- -
Lubricating oil (lubricants should conform to the specification as listed or to subsequent revisions thereto)	Lycoming Spec. No. 301-E	- -
Bore and stroke, in.	5.125 x 4.375	- -
Displacement, cu. in.	541.5	- -
Compression Ratio	7.3:1	- -
Weight (dry), lb.	See NOTE 7	- -
C.G. location (with starter & generator installed)	See NOTE 7	- -
Propeller shaft flange, SAE No. AS127	Type 2 modified	- -
Crankshaft dampers (torsional)	See NOTE 6	- -
Fuel injection	See NOTE 7	- -
Turbosupercharger	AiResearch (See NOTE 4)	- -
Ignition, dual	Scintilla (See NOTE 7)	
Ignition timing BTC	20	- -
Spark plugs	See NOTE 5	- -
Oil, sump capacity, qts. - total and usable	See NOTE 7	- -
NOTES	1 thru 9	- -

"- -" indicates "same as preceding model"; "—" indicates "does not apply"

Certification basis:

Regulations and Amendments	Model	Date of Application	Date Type Certificate No. E10EA Issued/Revised
CAR 13 Effective June 15, 1956	TIO-541-A1A	December 16, 1963	February 23, 1965
As Amended By 13-1, 13-2, & 13-3 & 13-4	TIO-541-E1A4	December 14, 1965	December 16, 1966
	TIO-541-E1B4	June 1, 1966	December 16, 1966
	TIO-541-E1C4	October 13, 1969	October 21, 1969
	TIO-541-E1D4	October 13, 1969	October 21, 1969

Production basis: Production Certificate No. 3

NOTE 1. Maximum permissible temperatures:

Cylinder head (well type thermocouple)	475°F
Cylinder base - This parameter dispensed with four engines equipped with internal piston cooling oil jets. See NOTE 8.	
Oil inlet	245°F
Fuel injector air inlet	300°F
Exhaust gas (Turbo inlet at location shown on Lycoming Dwg. Nos. 63204	1650°F (-A1A) -63250 (-E1A4, -E1B4) -63304 (-E1C4 & -E1D4))
Compressor temperature rise	(-A1A) 280°F (-E1A4, -E1B4, -E1C4, -E1D4) 320°F

NOTE 2. Pressure limits.

	Min.	Max.	Idle (Min.)
Fuel pressure limits (above fuel injector inlet air press.) (at inlet to fuel injector)	-A1A 29 p.s.i. -E1A4, -E1B4 -E1C4, -E1D4 20 p.s.i.	60 p.s.i.	12 p.s.i.
Oil pressure limits:	60 p.s.i.	90 p.s.i.	25 p.s.i.
Start and warm-up	—	100 p.s.i.	—
Fuel injector inlet pressure	—	40.5 in. Hg.	—
Manifold pressure	—	40 in. Hg.	—
Turbo supercharger exhaust back pressure	—	0.5 in. Hg.	—

NOTE 3. The following accessory provisions are available:

Accessory	-A1A	-E1A4 -E1B4 -E1C4 - E1D4	Rotation Facing Drive Pad	Speed Ratio to Crankshaft	Maximum Torque in. -lb. Cont	Maximum Torque in. -lb. Static	Maximum Overhang Moment in. - lb.
Starter	*	*	CC	16.566:1	—	450	150
Alternator	*	*	C	3.250:1	60	120	175
Vacuum or Hydraulic Pump	*	—	C	1.500:1	200	1600	50
Vacuum or Hydraulic Pump	*	—	CC	1.500:1	Total	Total	50
Vacuum or Hydraulic Pump	—	*	C	1.000:1	200	1600	50
Vacuum or Hydraulic Pump	—	*	CC	1.000:1	Total	Total	50
Tachometer	*	*	CC	.500:1	7	50	5
Propeller Governor	*	*	CC	.895:1	125	825	25
Fuel Pump	*	*	CC	1.000:1	25	450	25
Air Compressor	—	*	CC	1.000:1	Belt Limited		100

"C" - Clockwise, "CC" - Counter clockwise

* Standard ** Optional

NOTE 4. These engines are equipped with an AiResearch turbosupercharger models mounted as an integral part of the engines as shown on Lycoming Drawings:

	Turbosupercharger Model	Drawing No.
-A1A	T-1823	63204
-E1A4, -E1B4	T-1823	63250
-E1C4, -E1D4	T-1879	63304

Performance data for these engines are presented on Lycoming Curve Nos. 12987B(A1A), 13055A (E1A4, -E1B4, -E1C4, -E1D4).

This turbocharger meets the containment requirements of CAR 13.166 and does not require external protection. Air from the compressor of this turbocharger may be used for cabin pressurization.

NOTE 5. Spark plugs approved for use on these engines are listed in the latest revision of AVCO Lycoming Service Instruction No. 1042.

NOTE 6. These engines incorporate crankshafts with one fifth order and one sixth order dampers unless the digit "4" follows the model designation, i.e., -E1A4. Engines so designated, (---4), have one 3.5 order, one fourth order, one fifth order and one sixth order pendulum type counterweights.

NOTE 7. The following tabulation shows weight, C.G., fuel injectors, oil sump capacities and ignition:

		Center of Gravity, in.		Fuel	Oil Sump Capacities (Qts)		
		From Front Face of	Off Centerline	Injector	Usable 20°		Ignition Dual
Model	Weight	Prop Shaft Flange	of Crankshaft	Bendix	Total	Nose up or down	Bendix
-A1A	549	21.00	.06 Below & .13 Right	RSA-10AD1	14	10.0	S6LN-1208; S6RN-1209
-E1A4	595	23.35	.05 Below & .05 Left	RSA-10DB1	13	10.5	S6LN-1208; S6RN-1209
-E1B4	595	23.35	.05 Below & .05 Left	RSA-10DB1	13	10.5	S6LN-1208; S6RN-1209
-E1C4	586	22.86	.06 Below & .03 Right	RSA-10DB1	13	10.5	S6LN-1208; S6RN-1209
-E1D4	584	22.86	.06 Below & .03 Right	RSA-10DB1	13	10.5	S6LN-1208; S6RN-1209

NOTE 8. Model similarities and differences.

TI0-541-A1A — Basic model. Six cylinder, air cooled, horizontally opposed, direct drive, fuel injection, turbosupercharged engine with topside induction, down exhaust and side mounted accessory drives. Provides for single acting, controllable pitch propeller and has internal piston cooling oil jets.

-E1A4 — Similar to -A1A but has higher rating, uses different cylinder heads, cam shaft, crankshaft and additional counterweights. Has cabin pressurizing venturi.

-E1B4 — Similar to -E1A4 but does not incorporate a cabin pressurization venturi.

-E1C4 — Similar to -E1A4 except for different turbosupercharger with cast bracket, cast transition and separate wastegate.

-E1D4 — Similar to -E1B4 except for different turbosupercharger with cast bracket, cast transition and separate wastegate.

NOTE 9. Starters, generators and alternators approved for use on these engines are listed in the latest revision of AVCO Lycoming Service Instruction No. 1154.

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